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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,303	04/01/2004	Takashi Sato	04329.3300	8598

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EXAMINER

ROSASCO, STEPHEN D

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/814,303

Applicant(s)

SATO ET AL.

Examiner

Stephen Rosasco

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1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2005.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
4a) Of the above claim(s) 14-20 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-13 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/1/04.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

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Detailed Action

Applicant's election without traverse of Group I (claims 1-13) in the reply filed on 11/12/05 is acknowledged.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsudaka (6,249,597).

The claimed invention is directed to an exposure method, which comprises preparing a first mask in which a size of a mask pattern is measured in advance, calculating a first exposure quantity to be applied to the first mask to provide a first resist pattern by using the first mask, simulating optical intensity distributions on a wafer in a case where the first mask is used and an optical intensity distribution on the wafer in a case where a second mask is used, a size of a mask pattern of the second mask being measured in advance, calculating a difference in optical intensity between the first mask and the second mask from the simulated optical intensity distributions, and calculating a second exposure quantity to be applied to the second mask to provide a second resist pattern, from the first exposure quantity and the difference in optical intensity.

The applicant discusses the limitations of the prior art in that a lot of time and labor for calculating the optimum exposure conditions are required. The claimed invention uses simulation based on the measured size of the mask pattern.

Tsudaka teaches (see claims) the method and apparatus for the use of simulation, calculation and multiple exposures as in the claimed invention:

in particular Tsudaka teaches a method of correcting a mask pattern wherein the mask pattern of a photomask used in a photolithography process is made to deform so as to give a transfer image close to a desired design pattern, said method of correcting a mask pattern comprising the steps of: an evaluation point arranging step, a simulation step for simulating a transfer image obtained at exposure under predetermined transfer conditions using a photomask of a design pattern with evaluation points;

a comparison step for comparing for each evaluation point the difference between the simulated transfer image and said design pattern; and

a deformation step for deforming said design pattern in accordance with the differences compared for each evaluation point so that said differences become smaller, in said evaluation point arranging step, the evaluation points being arranged at the corners of the desired design pattern and the evaluation points being arranged at predetermined intervals at the sides of the pattern.

And wherein the design pattern deformed in said deformation step is used to repeat at least once the process from the simulation step to deformation step.

And wherein in said simulation step, the calculation is carried out for a two-dimensional light intensity on a substrate based on said design pattern and exposure conditions, the calculation and cumulatively addition is carried out for the effects on the exposure energy of any noted position on the two-dimensional plane of the substrate by the light intensity at a plurality of positions surrounding that any noted position based on the light intensity at the surrounding position and the distance between said noted position and surrounding position so as to calculate the latent image-forming intensity corresponding to the amount of exposure and development conditions, the finding is carried out for the contours of the threshold value for the distribution of latent image-

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forming intensity, and the calculation is carried out for the pattern defined by said contours as the transfer image.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Tanaka et al. (6,536,032) or Hatada et al. (6,811,953).

The claimed invention is directed to an exposure method, which comprises preparing a first mask in which a size of a mask pattern is measured in advance, calculating a first exposure quantity to be applied to the first mask to provide a first resist pattern by using the first mask, simulating optical intensity distributions on a wafer in a case where the first mask is used and an optical intensity distribution on the wafer in a case where a second mask is used, a size of a mask pattern of the second mask being measured in advance, calculating a difference in optical intensity between the first mask and the second mask from the simulated optical intensity distributions, and calculating a second exposure quantity to be applied to the second mask to provide a second resist pattern, from the first exposure quantity and the difference in optical intensity.

The applicant discusses the limitations of the prior art in that a lot of time and labor for calculating the optimum exposure conditions are required. The claimed invention uses simulation based on the measured size of the mask pattern.

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Tanaka et al. or Hatada et al. teach (see claims) the method and apparatus for the use of simulation, calculation and multiple exposures as in the claimed invention:

Tanaka et al. teach (see claims) a method of simulating an optical image by applying light through an exposure mask pattern, comprising the steps of: performing a re-sizing process of adding a prescribed positive bias DELTA to design data of the exposure mask pattern, thereby forming first mask-pattern data; performing a corner process on each corner represented by the first mask-pattern data, thereby forming second mask-pattern data; performing a re-sizing process of adding a prescribed negative bias DELTA to the second mask-pattern data, thereby forming third mask-pattern data; setting exposure conditions; and calculating an optical image in accordance with the third mask pattern data and the exposure conditions, on a substrate to which light is applied through the exposure mask pattern.

Hatada et al. teach (see claims) an exposure method comprising: an illumination step of illuminating a mask; and a transcription step; wherein said illumination step includes a step of making an optical intensity distribution at pupil of said illumination optical system higher at a peripheral portion than at a center portion; and said transcription step comprising: a first exposure step, which forms a first exposure region on said photosensitive substrate while making said optical intensity distribution at pupil of said illumination optical system higher at said peripheral portion than at said center portion with practically suppressing change in optical characteristics of each of a plurality of projection optical units, which is caused by irradiation of light; and a second exposure step, which forms on said photosensitive substrate a second exposure region that partially overlaps said first exposure region while making said optical intensity distribution at pupil of said illumination optical system higher at said peripheral portion than at said center portion with practically suppressing change in the optical

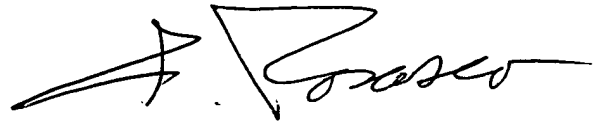
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characteristics of each of said plurality of projection optical units, which is caused by irradiation of light.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, sweeping flourish extending from the end of the name.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
12/29/05